

CLAIMS

What is claimed is:

1 1. A programmable access device for use in a network access system, said
2 programmable access device comprising:

3
4 first and second network interfaces through which packets are
5 communicated with a network;

6
7 a packet header filter and a forwarding table, wherein the forwarding
8 table is utilized to forward packets between the first and second network
9 interfaces, and wherein said packet header filter identifies messages received at
10 one of the first and second network interfaces on which policy-based services
11 are to be implemented and passes identified messages via a message interface
12 to an external processor for processing.

1 2. The programmable access device of Claim 1, wherein the packet header
2 filter receives packets directly from the first network interface.

1 3. The programmable access device of Claim 2, wherein the packet header
2 filter is a first packet header filter, and wherein the programmable access
3 device further comprises a second packet header filter that receives packets
4 directly from the second network interface.

1 4. The programmable access device of Claim 1, wherein the packet header
2 filter filters packets for service processing based upon protocol information
3 pertaining to protocol layers higher than layer 3.

1 5. The programmable access device of Claim 1, and further comprising a
2 policer that polices packets by reference to traffic parameters.

1 6. The programmable access device of Claim 5, wherein the policer
2 comprises a marker that marks packets that do not conform with the traffic
3 parameters.

1 7. The programmable access device of Claim 1, and further comprising at
2 least a usage monitor that monitors at least one traffic type.

1 8. The programmable access device of Claim 7, wherein the usage
2 monitor has an associated threshold that when exceeded generates a reporting
3 event for the usage monitor.

1 9. The programmable access device of Claim 8, and further comprising a
2 reporting interface that communicates the reporting event to an external
3 processor.

1 10. The programmable access device of Claim 9, wherein the associated
2 threshold comprises a session activity level threshold.

1 11. The programmable access device of Claim 7, and further comprising a
2 fault monitor.

1 12. The programmable access device of Claim 1, and further comprising
2 one or more output buffers for outgoing packets.

1 13. The programmable access device of Claim 12, and further comprising a
2 scheduler associated with the one or more output buffers that schedules the
3 transmission of outgoing packets within the one or more output buffers.

1 14. The programmable access device of Claim 13, wherein the scheduler
2 supports multiple quality of service classes.

1 15. The programmable access device of Claim 1, and further comprising a
2 control interface through which said packet header filter and said forwarding
3 table are programmed.

1 16. The programmable access device of Claim 15, and further comprising
2 at least a programmable monitor that monitors at least one programmed traffic
3 type.

1 17. The programmable access device of Claim 15, and further comprising a
2 policer that polices packets by reference to programmed traffic parameters.

1 18. The programmable access device of Claim 15, and further comprising
2 one or more output buffers for outgoing packets and an associated scheduler
3 that transmits the outgoing packets from the one or more output buffers
4 through the second network interface according to a programmed
5 methodology.

1 19. The programmable access device of Claim 1, wherein the identified
2 message is a session initiation protocol (SIP) message.

1 20. The programmable access device of Claim 1, wherein the identified
2 message is an Internet Group Multicast Protocol (IGMP) message.

1 21. The programmable access device of Claim 1, wherein the identified
2 message is a Resource Reservation Protocol (RSVP) message.

1 22. The programmable access device of Claim 1, and further comprising a
2 plurality of protocol-specific state machines for a respective plurality of
3 protocol types.

1 23. The programmable access device of Claim 1, wherein said plurality of
2 protocol-specific state machines include a transport control protocol (TCP)
3 state machine that, responsive to a control command, provides preferential
4 treatment to a particular TCP session.

1 24. The programmable access device of Claim 1, and further comprising a
2 reporting interface through which the programmable access device reports
3 state information for active sessions to an external processor.

1 25. The programmable access device of Claim 24, wherein the reporting
2 interface reports the state information for an active session in response to

3 allocation of service to a new external service controller.

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1 26. A method of packet handling in a programmable access device of a
2 network access system, said method comprising:

3
4 in response to receiving a series of packet at a first network interface of a
5 programmable access device, filtering the series of packets at the programmable
6 access device to identify messages upon which policy-based services are to be
7 implemented;

8
9 passing identified messages to an external processor for service processing;
10 and

11
12 for messages that are not identified, routing packets by reference to a
13 forwarding table in the programmable access device and outputting the routed
14 packets at a second network interface of the programmable access device.

1 27. The method of Claim 26, and further comprising receives packets at the
2 packet header filter directly from the first network interface.

1 28. The method of Claim 27, wherein the packet header filter is a first
2 packet header filter, said method further comprising receiving packets at a
3 second packet header filter of the programmable access device directly from
4 the second network interface.

1 29. The method of Claim 26, wherein filtering comprises filtering packets
2 for service processing based upon protocol information pertaining to protocol
3 layers higher than layer 3.

1 30. The method of Claim 26, and further comprising policing packets by
2 reference to traffic parameters utilizing a policer in the programmable access
3 device.

1 31. The method of Claim 30, wherein policing comprises marking packets
2 that do not conform with the traffic parameters.

1 32. The method of Claim 26, wherein the programmable access device
2 includes at least a usage monitor, said method further comprising monitors at
3 least one traffic type in said series of packets.

1 33. The method of Claim 32, wherein the usage monitor has an associated
2 threshold, said method further comprising generating a reporting event for the
3 usage monitor when the threshold is exceeded.

1 34. The method of Claim 33, and further comprising communicating the
2 reporting event to an external processor via a reporting interface.

1 35. The method of Claim 34, wherein generating a reporting event
2 comprises generating a reporting event in response to a session activity level
3 threshold.

1 36. The method of Claim 32, and further comprising monitoring faults
2 utilizing a fault monitor in said programmable access device.

1 37. The method of Claim 26, and further comprising buffering outgoing
2 packets in one or more output buffers in said programmable access device.

1 38. The method of Claim 37, and further comprising scheduling the
2 transmission of outgoing packets within the one or more output buffers to
3 support multiple quality of service classes.

1 39. The method of Claim 26, and further comprising programming said
2 programmable access device through a control interface of said programmable
3 access device.

1 40. The method of Claim 39, wherein the programmable access device
2 further includes at least one programmable monitor, said method further
3 comprising monitoring at least one programmed traffic type utilizing said at
4 least one programmable monitor.

1 41. The method of Claim 39, wherein said programmable access device
2 includes a policer, said method further comprising policing packets by
3 reference to programmed traffic parameters.

1 42. The method of Claim 39, wherein the programmable access device
2 includes one or more output buffers for outgoing packets and an associated
3 scheduler, said method comprising transmitting the outgoing packets from the
4 one or more output buffers through the second network interface according to a
5 programmed methodology.

1 43. The method of Claim 26, wherein the identified message is a session
2 initiation protocol (SIP) message.

1 44. The method of Claim 26, wherein the identified message is an Internet
2 Group Multicast Protocol (IGMP) message.

1 45. The method of Claim 26, wherein the identified message is a Resource
2 Reservation Protocol (RSVP) message.

1 46. The method of Claim 26, and further comprising maintaining in said
2 programmable access device a plurality of protocol-specific state machines for
3 a respective plurality of protocol types.

1 47. The method of Claim 26, wherein said plurality of protocol-specific
2 state machines include a transport control protocol (TCP) state machine, and
3 wherein the method further comprises providing preferential treatment to a
4 particular TCP session by said programmable access device in response to a
5 command.

1 48. The method of Claim 26, and further comprising reporting state
2 information for active sessions to an external processor via a reporting
3 interface of the programmable access device.

1 49. The method of Claim 48, wherein reporting comprises reporting the state
2 information for an active session in response to allocation of service to a new

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